REMARKS

The Office Action has been reviewed and the Examiner's comments carefully considered. Claims 22 has been amended. Claim 24 is added. No claims have been canceled. Thus, claims 1-14, 16-22, and 24 are pending in this application.

Claim objection

Claim 22 is objected to because "at least one spring member" in line 3 should have the article "said" before it. Claim 22 has been amended to correct this minor grammatical error. Reconsideration and withdrawal of the objection are respectfully requested.

Prior art rejection

Claims 1-7 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication 2002/0023517 ("Ochiai") in view of JP-2002-154439 ("Keiichi"). The rejection should be withdrawn because Ochiai, Keiichi, or any combination thereof does not disclose, teach or suggest the claimed invention.

For example, claim 1 recites a steering wheel comprising: a metal core member, at least one dampening element, at least one spring member, a sleeve encapsulating said dampening element, and a material covering the rim and the at least one dampening element, "wherein the dampening element, the at least one spring member, and the sleeve are secured within a portion of the rim." Ochiai does not teach or suggest this combination of features.

The Office Action correctly points out that Ochiai does not disclose at least one spring member extending about said periphery thereby supporting the dampening element. (Paragraph 3 of the Office Action.) The core metal 11 of Ochiai comprises a rim core metal 15, a boss core metal 16 (or a boss plate), and a spoke core metal 17. (Paragraph 0041 of Ochiai.) The cover member W2 and the weight body W1 of Ochiai can be placed inside the rim core metal. (Figs. 4, 7 and 9-19 of Ochiai.) The cover member W2 of Ochiai merely covers the weight body W1 to act as a silencer (paragraph 0057 of Ochiai), and can be made of various kinds of rubber materials (paragraph 0059 of Ochiai), soft plastic materials (paragraph 0059 of Ochiai), cloth or nonwoven fabric (paragraph 0093 of Ochiai), or yarn or string (paragraph 0093 of Ochiai.). Also, a cover portion 12 of Ochiai partially covers the core metal 11 and comprises an upper rim cover 71 and a lower rim cover 72 for covering the rim core metal 15 and a part of the spoke core metal 17. (Paragraphs 0040 and 0074 of Ochiai.) As pointed, out Ochiai does not teach or suggest at least one spring member

extending about the periphery of the weight body W1. Keiichi does not cure the deficiencies of Ochiai.

The steering wheel of Keiichi discloses a wheel case 1, an annular mass 2, and a resilient piece 3. The wheel case 1 is the rim section of the steering wheel to be grasped by an operator, and is connected with the boss plate 5 attached in the steering shaft through two or more spokes 4. (Paragraph 0011 of the Appendix, which is a machine translation of Keiichi.) The wheel case 1 of Keiichi comprises two case members 11 and 12 (paragraph 0011 of the Appendix), which are analogous to the upper and lower rim covers 71 and 72 of Ochiai. It is asserted that the wheel case 1 is considered to be a sleeve. (Paragraph 3 of the Office Action). However, the wheel case 1 cannot be considered to be a sleeve because it is not secured within a portion of the rim of any metal core member, including annular mass 2. Indeed, there is nothing to teach or suggest that the wheel case 1 is meant to be secured in anything, but rather is the external material of the steering wheel. Furthermore, one with ordinary skill in the art would not consider the wheel case 1 to be analogous to the sleeve of claim 3 or the cover member W2 of Ochiai because it clearly provides the function of being grasp by an operator, which would be analogous to the cover portion 12 of Ochiai and the material covering the rim and the at least one dampening element of claim 1.

The annular mass 2 of Keiichi is a metal ring-like structure providing the basic skeleton of the gripping portion of the steering wheel. (Paragraph 0012 of the Appendix and Figures 1 and 5 of Keiichi.) It is asserted that the annular mass 2 of Keiichi is considered to be a dampening element. (Paragraph 3 of the Office Action.) However, the annular mass 2 of Keiichi cannot be considered to be the dampening element because, if the mass 2 is a dampening element, Keiichi would not teach a metal core with a portion of a rim in which the dampening element is secured. Indeed, there is nothing to teach or suggest that the annular mass is meant to be secured in a substantially circular rim of any metal core member, but rather is the metal core member itself. At best, the annular mass 2 of Keiichi would be analogous to the metal core 11 of Ochiai and the metal core member of claim 1 because they provide the same function of providing the basic metal skeleton for the gripping portion of the steering wheel.

The resilient piece 3 and the annular mass 2 of Keiichi are used as a dynamic damper for the spring-mass system of Keiichi. (See paragraph 0007 of the Appendix.) The resilient piece 3 is disposed between the inside of wheel case 1 and the annular mass 2 of Keiichi. (See paragraph 0010 of the Appendix.) It is then asserted in the Office Action that the resilient

piece 3 of Keiichi is a spring member extending about a periphery of a dampening element, and it would have been obvious to modify the device of Ochiai to include the spring member of Keiichi "for the purpose of coupling the inside surface of the sleeve resiliently with the dampening element such that the dampening element and the spring element constitute a spring-mass system for exerting a vibration controlling function." (Paragraph 3 of the Office Action.) The rejection is improper because there is no reason to use the resilient pieces 3 of Keiichi in the device of Ochiai.

The proposed reason for using the resilient pieces of Keiichi in the device of Ochiai (i.e., to couple the inside surface of the cover member W2 resiliently with the weight body W1) is inapplicable because the cover member W2 is coupled to the weight body W1 in nearly all the embodiments of Ochiai by virtue of the cover member 2 being molded (adhered) integrally with the weight body W1. (Paragraph 0060 of Ochiai.) For these embodiments, one with ordinary skill in the art would not have a reason to interject another element between two pieces that are adhered together for the purposes of "coupling" them.

The only exceptions in Ochiai in which the cover member W2 does not adhere to the weight body W1 of Ochiai are the embodiments shown in Figs. 11 and 12 of Ochiai. However, to couple the weight body W1 to the cover member W2 using the resilient pieces of Keiichi in the embodiments of Figs. 11 and 12 of Ochiai would make these embodiments unsatisfactory of their intended purpose. The whole principle of operation of the device of Keiichi is to have the weight body W1 be movable (received but not fixed) in the core metal 11 so that the weight W moves during vibration of the core metal 11. (Paragraph 0090 of Keiichi.) During this vibration, the weight W abuts on the internal wall of the core metal 11, which is slightly delayed relative to the vibration of the core metal 11. *Id.* The frequency of the slightly delayed vibration of the weight W interferes with the frequency of the vibration of the core metal 11, thus dampening the vibration of the core metal 11. *Id.* To use the resilient pieces of Keiichi between the weight body W1 and the cover member W2 in the embodiments of Figs. 11 and 12 of Ochiai would prevent the weight body W1 from moving within the core metal 11, thus preventing the vibration dampening effect sought in Ochiai. Such a modification of the embodiments of Figs. 11 and 12 of Ochiai would defeat the principle of operation of the device of Ochiai, thus making the embodiments of Figs. 11 and 12 unsatisfactory of their intended purpose. Such a modification is non-obvious, as provided

in MPEP 2143.01.[1] Therefore, the rejection is improper because there is no reason to use the resilient pieces of Keiichi in the device of Ochiai because most embodiments of Ochiai have the cover member W2 adhered to the weight body W1 and those embodiments of Ochiai that do not cannot be modified for the reason that the principle of operation for these embodiments would be defeated.

Also, the proposed combination of Ochiai and Keiichi does not teach or suggest all the features of claim 1. For example, the dampening element, the at least one spring member, and the sleeve are secured within a portion of the rim of the core metal member. It is asserted that the proposed combination would result in such a configuration, because the sleeve and the dampening element of Ochiai are disclosed in the rim and the addition of the spring member around the periphery of the dampening element taught by Keiichi would also be within a portion of the rim. (Paragraph 3 of the Office Action.) As previously mentioned, the annular mass 2 of Keiichi is not a dampening element (secure within a portion of the rim of a metal core member) but is the metal core member. In addition, the wheel case 1 of Keiichi is not a sleeve (secured within a portion of the rim of the metal core member) but is a material covering the rim. There is nothing to teach or suggest that the annular mass 2 and the resilient pieces 3 around the periphery thereof are meant to be secured within any metal core member. At best, one with ordinary skill in the art would be motivated to place the resilient pieces 3 between the core metal 11 of Ochiai and the cover portion 12 of Ochiai because the core metal 11 of Ochiai is analogous (in function and design) to the annular mass 2 of Keiichi and the cover portion 12 of Ochiai is analogous (in function and design) to the wheel case 1 of Keiichi. Thus, any proposed combination of Ochiai and Keiichi would not teach or suggest the resilient pieces 3 of Keiichi secured within the portion of the rim of the core metal 11 of Ochiai. Accordingly, no combination of Ochiai and Keiichi teaches or suggests all the features of claim 1, and the rejection should be withdrawn.

Claims 2-7 and 21-22 depend from and contain all the features of claim 1, and are allowable therewith for at least the same reasons set forth above, without regard to the further patentable limitations contained therein.

For at least these reasons, reconsideration and withdrawal of the rejection are respectfully requested.

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[1] "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)."

Allowability of claim 24

Claim 24 depends from and contains all the features of claim 1, and is allowable for the same reasons as claim 1, without regard to the further patentable features contained therein.

Conclusion

The present application is now believed to be in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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APPENDIX

Machine Translation of JP 2002-154439

[Detailed Description of the Invention]

[0001] [Field of the Invention] This invention aims at the vibration deadening especially about the steering wheel of an automobile.

[0002] [Description of the Prior Art] Generally, if rotation imbalance arises according to omission of a balance weight etc. into a tire during transit of an automobile, generating vibration of the circumferencial direction called a handle flutter or a shimmy to a steering wheel is known by transmitting the vibration through a steering shaft. Although this vibration changes also with types of a car, generally in the vehicle speed 100 - 130 km/h (rotation primary vibration of a tire: 10-30Hz), the amplitude becomes large by resonance in many cases.

[0003] In order to reduce vibration of such a steering wheel, various techniques are developed from the former and, typically, what is indicated by JP,2000-16300,A or JP,10-181611,A is known. The former by detecting vibration and giving the electrical potential difference according to the output to a piezoelectric-crystal element through a control means by the sensor It is what excites the spoke section which hits the transfer path of the vibration to the rim section from a steering shaft by the vibromotive force of a piezoelectric-crystal element so that vibration of the rim section may be controlled. The latter Friction damping of the vibration produced on the body of a steering wheel is carried out by making a wheel cover fix an elastic body and making the spoke section of the body of a steering wheel carry out friction engagement of this elastic body.

[0004] [Problem(s) to be Solved by the Invention] However, the technique which became an expensive system and was indicated by JP,10-181611,A since the technique indicated by JP,2000-16300,A constituted the control circuit using the oscillating detection sensor or the piezoelectric-crystal element produces a problem in the operability in steering, when the elastic body intervenes between the rim side of the body of a steering wheel, and a boss side.

[0005] It is low cost, and the place which this invention was made by the basis of the above situations and is made into the technical technical problem is to offer the possible vibration-deadening structure of reducing the handle flutter of a steering wheel, or shimmy vibration, without moreover affecting operability.

[0006] [Means for Solving the Problem] The technical technical problem mentioned above is effectively solvable with this invention. That is, the steering wheel concerning invention of claim 1 is equipped with the rubber-like elasticity object which connects elastically between the mass arranged at flight readiness, and the insides of said wheel case and said masses in the centrum of a hollow annular wheel case and this wheel case.

[0007] In this configuration, a mass and a rubber-like elasticity object function as a dynamic damper of the spring-mass system which has predetermined resonance frequency. That is, since the tuned-damper style of the spring-mass system which consists of a mass and a rubber-like elasticity object resonates with a phase angle contrary to input vibration when vibration of a specific frequency region is inputted, the vibration displacement by the resonance does a vibration-deadening function so by being generated to the variation rate and hard flow by inputted vibration.

[0008] Moreover, the space where the steering wheel concerning invention of claim 2 was formed with the wheel case, the mass, and the rubber-like elasticity object in the configuration of claim 1 is filled up with a viscous liquid.

[0009] If a wheel case and a mass carry out repetitive displacement relatively with resonance of the spring-mass system which consists of the mass and rubber-like elasticity object by the input or it of vibration according to this configuration, since the viscous liquid which intervenes between them will produce friction damping in response to a shear in a hoop direction, in addition to the effectiveness by the configuration of claim 1, the reduction effectiveness of the amplitude by friction damping is acquired.

[0010] [Embodiment of the Invention] The sectional view, drawing 3 , and drawing 4 of the decomposition condition which cuts the sectional view which drawing 1 cuts the gestalt of operation of the first of the steering wheel concerning this invention at the flat surface which intersects perpendicularly with an axial center, and is shown, and drawing 2 at the flat surface which similarly passes along an axial center, and is shown are the perspective view showing the example of a configuration of the rubber-like elasticity object applied with the gestalt of this operation. In the steering wheel first shown in drawing 1 and drawing 2 , the annular mass by which the wheel case hollow annular in a reference mark 1 and the reference mark 2 have been arranged at flight readiness at the centrum of this wheel case 1, and a reference mark 3 are the rubber-like elasticity objects which intervened between the inside of the wheel case 1, and the annular mass 2.

[0011] The wheel case 1 is a part equivalent to the rim section of the steering wheel for steering by an operator grasping, and is connected with the boss 5 attached in the steering shaft which is not illustrated through two or more spokes 4. Moreover, when being mutually joined by the sealing condition with the planes of composition 11a and 12a which this wheel case 1 consists of case members 11 and 12 of the pair of a cross-section semicircle arc manufactured with the rigid big ingredient as shown in drawing 2 , and make the flat surface which intersects perpendicularly with an axial center, it makes hollow annular. The stop pawls 11b and 12b in which sex fitting is possible, and the stop hole (illustration abbreviation) of each other are formed in the planes of composition 11a and 12a of the case members 11 and 12 at intervals of predetermined.

[0012] The annular mass 2 consists of a metal ring of the wheel case 1 and this alignment, and is arranged with a uniform predetermined clearance between the insides of the wheel case 1.

[0013] As vulcanization adhesion is carried out in one at intervals of circumferencial direction predetermined [the] on the front face of nothing and the annular mass 2 or it is shown in drawing 3 , the rubber-like elasticity object 3 annular or tubed After fabricating the annular mass 2 to an abbreviation C typeface as another object, it is what opened between the opposite edge 3a and 3a (slit section), and was inserted in the annular mass 2. Balance is good for three or more (at the example shown in drawing 1 , they are six places) circumferencial directions between the wheel case 1 and the annular mass 2, for example, it is arranged at equal intervals.

[0014] That is, the steering wheel by the gestalt of this operation combines the case members 11 and 12 of the pair which constitutes the wheel case 1 so that it may be crowded on both sides of the rubber-like elasticity object 3 equipped by the annular mass 2 and this, and it is assembled by joining plane-of-composition 11a and 12a. And in the state of the assembly

which is greatly formed slightly rather than the inside of the wheel case 1, the annular mass 2, and the clearance between between, therefore is shown in drawing 1 , the direction thickness of a path in the condition of not equipping carries out the pressure welding of each rubber-like elasticity object 3 by the suitable planar pressure for the inside of the wheel case 1, and is in the condition of having been suitably compressed between the annular masses 2.

[0015] The annular mass 2 and the rubber-like elasticity object 3 which has connected this with the inside of the wheel case 1 elastically constitute the tuned-damper style of a spring-mass system. And the resonance frequency (resonant frequency) of this tuned-damper style is set as 10-30Hz with the inertial mass of the annular mass 2 to a circumferencial direction, and the shear spring constant of the rubber-like elasticity object 3 over a circumferencial direction. In addition, this frequency is equivalent to the primary vibration frequency by rotation of the tire in the vehicle speed 100 - 130 km/h, and is in the field to which that vibration acceleration serves as max.

[0016] The resonance frequency of a spring-mass system by the rubber-like elasticity object 3 and the annular mass 2 can be set up so that the frequency domain made into an aim may be suited with the quality of the material (specific gravity) of the annular mass 2, a size or the arrangement number (however, three or more places) of the annular mass 2, the quality of the material, the amount of compression, the direction thickness t1 of a path, and the thickness t2 of shaft orientations. Moreover, since that spring constant falls by making this rubber-like elasticity object 3 into the configuration which has two or more simple heights 3b prolonged in a radial in the direction of a path rather than annular as shown in drawing 4 when carrying out vulcanization adhesion of the rubber-like elasticity object 3 in [the front face of the annular mass 2] one, resonance frequency of said spring-mass system can be made low.

[0017] According to the steering wheel equipped with the above configuration, for example at the time of transit by the vehicle speed 100 - 130 km/h If vibration (a handle flutter or shimmy) of the circumferencial direction of the steering wheel which originates in the rotation imbalance by omission of the balance weight of a tire etc., and is generated is inputted The tuned-damper style of the spring-mass system which consists of an annular mass 2 and a rubber-like elasticity object 3 resonates by the opposite phase to input vibration, and demonstrates a vibration-deadening function by this. For this reason, vibration of this kind can be effectively reduced by setting the resonance frequency of said damper system as the frequency from which a handle flutter or the amplitude by shimmy vibration serves as the maximum.

[0018] Moreover, since the tuned-damper style of the spring-mass system which consists of an annular mass 2 and a rubber-like elasticity object 3 is built in the wheel case 1 equivalent to the rim section of a steering wheel according to this configuration, a tie in with air bag equipment, other devices, for example, horn equipment, etc. is not produced by addition of this damper system. And the annular mass 2 and the rubber-like elasticity object 3 do not constitute the transfer section of the actuation torque in steering, and since the wheel case 1 connected with the boss 5 through two or more spokes 4 is formed with the rigid big ingredient, operability does not get worse.

[0019] Next, drawing 5 is the sectional view cutting and showing the gestalt of operation of the second of the steering wheel concerning this invention at the flat surface which intersects perpendicularly with an axial center. As a fundamental configuration, the steering wheel by the gestalt of this operation The hollow annular wheel case 1 which was explained previously and which was connected with the boss 5 through two or more spokes 4 like the gestalt of the

first operation, It has the rubber-like elasticity object 3 which intervened at three or more circumferencial directions between the annular mass 2 arranged at flight readiness at the centrum of this wheel case 1, and the inside of the wheel case 1 and the annular mass 2.

[0020] In the gestalt of the second operation, a different place from the gestalt of the first operation which is shown in drawing 5 and which is shown in drawing 1 and drawing 2 is to have filled up the rubber-like elasticity objects 3 and 3, the space S and S between --, and -- with the viscous liquids 6, such as silicone oil. This viscous liquid 6 within a cistern the case members 11 and 12 (refer to drawing 2) of the pair which constitutes the wheel case 1 In the process which assembles the steering wheel concerned by combining so that the rubber-like elasticity object 3 with which the annular mass 2 and this were equipped may be put, and joining plane-of-composition 11a of the case members 11 and 12, and 12a in seal Some liquids in said cistern are shut up in the wheel case 1.

[0021] According to this configuration, the tuned-damper style of the spring-mass system which consists of an annular mass 2 and a rubber-like elasticity object 3 like the gestalt of the first operation explained previously resonates by the opposite phase to the handle flutter or shimmy vibration inputted, and demonstrates a vibration-deadening function by this. And if the wheel case 1 and the annular mass 2 carry out repetitive displacement relatively to a circumferencial direction with resonance of the spring-mass system which consists of the annular mass 2 and the rubber-like elasticity object 3 by the handle flutter inputted, shimmy vibration, or this, since the viscous liquid 6 which intervenes between them will receive the shear of a circumferencial direction, attenuation by friction can be obtained.

[0022] Drawing 6 shows the oscillation characteristic of the steering wheel concerning this invention in contrast with structure conventionally, the acceleration like a circumferencial direction oscillating being strange takes on an axis of ordinate, and the vehicle speed is taken along the axis of abscissa. The characteristic ray shown with an alternate long and short dash line all over drawing is the oscillation characteristic of the steering wheel of structure conventionally which has not prepared the spring-mass system which consists of an annular mass 2 and a rubber-like elasticity object 3, and the peak of the acceleration of hoop direction vibration has appeared in the vehicle speed V0 neighborhood (usually 100 - 130 km/h).

[0023] On the other hand, the characteristic ray shown in drawing 6 as a continuous line is the oscillation characteristic of the steering wheel which prepared the spring-mass system which consists of an annular mass 2 and a rubber-like elasticity object 3 in the centrum, the gestalt 1 of the first operation, i.e., the wheel case, in this invention. According to the gestalt of this first operation, as a result of the tuned-damper style of said spring-mass system demonstrating the vibration-deadening operation by resonance in the vehicle speed V0 neighborhood, the acceleration of hoop direction vibration in the vehicle speed V0 neighborhood is reduced remarkably.

[0024] In what prepared only the tuned-damper style which consists of an annular mass 2 and a rubber-like elasticity object 3 like the gestalt of the first operation here Although it is much smaller than the case where peak value does not prepare said tuned-damper style near [vehicle speed V1] a low-speed side and near [vehicle speed V2] a high-speed side rather than it while the acceleration of hoop direction vibration in the vehicle speed V0 neighborhood can be reduced remarkably The peak of the acceleration of hoop direction vibration newly appears, respectively.

[0025] The characteristic ray shown in drawing 6 with a broken line is the oscillation characteristic of the steering wheel filled up with the viscous liquid 6 while preparing the spring-mass system which consists of an annular mass 2 and a rubber-like elasticity object 3 in a centrum, the gestalt 1 of the second operation, i.e., the wheel case, in this invention. Even if the peak of the acceleration in this invention according [the gestalt of the second operation] to resonance to the vehicle speed V1 and the V2 neighborhood by the tuned-damper style as mentioned above is newly formed, that peak value is effectively reduced by the friction attenuation of a viscous liquid 6, so that clearly from this characteristic ray.

[0026] As a rubber-like elasticity object 3, in addition, when the annular thing and the thing of a configuration which has two or more heights 3b as shown in previous drawing 4 have been arranged by turns, [for example,] Since a viscous liquid 6 can move freely between Space S and S and -- through crevice 3c of the rubber-like elasticity object 3 shown in drawing 4 In this case, crevice 3c acts as an orifice and the friction damping effect generated when a viscous liquid 6 carries out liquid column resonance to a circumferencial direction can also be expected in a predetermined frequency region.

[0027] [Effect of the Invention] Since the mass and rubber-like elasticity object which were established in the hollow annular wheel case demonstrate a vibration-deadening function as a tuned-damper style by resonance to input vibration of a predetermined frequency according to the steering wheel concerning invention of claim 1, vibration of steering wheels, such as a handle flutter or shimmy vibration, can be effectively reduced by setting the resonance frequency as the frequency of the amplitude peak of input vibration. And since operability is not worsened since said mass and a rubber-like elasticity object do not constitute the transfer section of actuation torque, and a control circuit etc. is not needed, it can provide cheaply.

[0028] Moreover, since the friction damping by the viscous liquid is obtained in addition to above-mentioned effectiveness, the small amplitude peak newly generated by the tuned-damper style of the spring-mass system which consists of a mass and a rubber-like elasticity object is also reduced, and the steering wheel concerning invention of claim 2 can realize the oscillating reduction effectiveness of having excelled further.

[Claim 1] The steering wheel characterized by having the rubber-like elasticity object (3) which connects elastically between the mass (2) arranged at flight readiness in the centrum of a hollow annular wheel case (1) and this wheel case (1), and the insides of said wheel case (1) and said masses (2).

[Claim 2] The steering wheel according to claim 1 characterized by filling up with a viscous liquid (6) the space (S) formed with the wheel case (1), the mass (2), and the rubber-like elasticity object (3).